

1           1.    A method comprising:  
2                reducing the grain size of a phase change  
3 material; and  
4                reducing the crystallization time of the phase  
5 change material.

1           2.    The method of claim 1 wherein reducing the grain  
2 size of the phase change material includes doping the  
3 material with nitrogen.

1           3.    The method of claim 2 wherein reducing the grain  
2 size of the phase change material includes doping the  
3 material with nitrogen and oxygen.

1           4.    The method of claim 1 wherein reducing the  
2 crystallization time of the phase change material includes  
3 doping the phase change material with titanium.

1           5.    The method of claim 4 including doping the phase  
2 change material with ions of titanium.

1           6.    The method of claim 5 including sputtering  
2 titanium.

1           7.    The method of claim 5 including ion implanting  
2   titanium to reduce the crystallization time of the phase  
3   change material.

1           8.    The method of claim 4 including providing a layer  
2   of titanium proximate to said phase change material.

1           9.    The method of claim 8 including providing the  
2   layer of titanium sufficiently proximate to the phase  
3   change material that when the titanium is heated, titanium  
4   diffuses into the phase change material.

1           10.   The method of claim 9 including causing the  
2   titanium to diffuse into the phase change material as a  
3   result of heating during processing of the phase change  
4   material.

1           11.   A phase change material comprising:  
2                a chalcogenide;  
3                a species introduced into the chalcogenide  
4   material to reduce grain size; and  
5                a species introduced into the chalcogenide to  
6   increase crystallization speed.

1           12.   The material of claim 11 wherein said  
2   chalcogenide includes  $\text{Ge}_2\text{Sb}_2\text{Te}_5$ .

1        13. The material of claim 11 wherein the grains of  
2 the chalcogenide are less than approximately 10 nanometers.

1        14. The material of claim 11 wherein the species to  
2 reduce grain size includes nitrogen.

1        15. The material of claim 11 wherein the species to  
2 increase crystallization speed includes titanium.

1        16. A device comprising:  
2            a substrate; and  
3            a layer of chalcogenide material over said  
4 substrate, said chalcogenide material including a species  
5 to reduce the grain size of the chalcogenide material and a  
6 species to increase the crystallization speed of said  
7 chalcogenide material.

1        17. The device of claim 16 wherein said chalcogenide  
2 material includes  $\text{Ge}_2\text{Sb}_2\text{Te}_5$ .

1        18. The device of claim 16 wherein the grains of the  
2 chalcogenide material are less than approximately 10  
3 nanometers.

1        19. The device of claim 16 wherein the species to  
2 reduce grain size includes nitrogen.

1           20. The device of claim 16 wherein the species to  
2 increase crystallization speed includes titanium.

1           21. The device of claim 16 wherein the device is a  
2 semiconductor memory.

1           22. The device of claim 16 including an insulator  
2 over said substrate and under said chalcogenide material.

1           23. The device of claim 22 including a heater  
2 extending through said insulator to said chalcogenide  
3 material to heat said chalcogenide material.

1           24. The device of claim 16 including titanium  
2 containing layer under said chalcogenide material.

1           25. The device of claim 24 wherein said titanium  
2 containing layer is sufficiently proximate to said  
3 chalcogenide material that titanium may diffuse into the  
4 phase change material upon heating.

1           26. A system comprising:  
2               a processor-based device;  
3               a wireless interface coupled to said processor-  
4 based device; and

5           a semiconductor memory coupled to said device,  
6   said memory including the substrate, said memory further  
7   including a layer of chalcogenide material over said  
8   substrate, said chalcogenide material including a species  
9   to reduce the grain size of the chalcogenide material and a  
10   species to increase the crystallization speed of said  
11   chalcogenide material.

1           27.   The system of claim 26 wherein the species to  
2   reduce grain size includes nitrogen.

1           28.   The system of claim 26 wherein the species to  
2   increase crystallization speed includes titanium.

1           29.   The system of claim 26 including an insulator  
2   over said substrate and under said chalcogenide material.

1           30.   The system of claim 29 including a heater  
2   extending through said insulator to said chalcogenide  
3   material to heat said chalcogenide material.